SCIENTIFIC PUBLICATIONS

OF THE

BIOSCIENCE PROGRAMS DIVISION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

VOLUME II. ENVIRONMENTAL BIOLOGY

SCIENTIFIC PUBLICATIONS OF THE BIOSCIENCE PROGRAM DIVISION

VOLUME II ENVIRONMENTAL BIOLOGY

by

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of the

Biological Sciences Communication Project

C. W. Shilling, M.D., Director

sponsored by

The George Washington University

April 20, 1967

work performed under NASA Contract

NSR 09 010 027

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PREFACE

This bibliography was prepared to supplement the needs of various bioscience administrators at the National Aeronautics and Space Administration for maintaining a current awareness in their respective fields. When critically analyzed, bibliographies provide meaningful insight to the state of activities for scientific endeavors by defining areas of pursuit, providing records of accomplishment, identifying scientists and laboratories engaged in various scientific activities, revealing the direction of research and the areas of gradient emphasis in addition to listing the available literature in a particular subject field. For these reasons the importance of bibliographies is being increasingly recognized by both science administrators and research scientists.

The more than 1,400 citations in the total work represent the publication efforts of the grantees and contractors of the Bioscience Program Division since it was established. Letters were sent to the principal investigators requesting a list of publications resulting from research supported by grants or contracts from this division. The citations included in this bibliography were provided in response to this letter. Only those papers appearing in the serial literature and widely distributed report literature were considered. Theses and doctoral dissertations were omitted since such research would probably be published in scientific journals at a later date.

These citations have been collated into separate volumes for each program branch. A few citations predate the establishment of the branch offices under which they appear but are included because they resulted from efforts subsequently subsumed under these program offices. The volumes are enumerated as follows: Volume I, Behavioral Biology; Volume II, Environmental Biology; Volume III, Exobiology; Volume IV, Physical Biology; Volume V and VI, Planetary Quarantine and Bioscience Communications, respectively. Because of the brevity of the latter two bibliographies, they have been combined under one cover.

Each volume is divided into a number of sections beginning with the literature citations listed chronologically and according to the authors' surname. This arrangement reveals to some extent the growth and development of research under the direction of the program administrators. To provide access to these references both an author index and permuted title index are included.

An appendix is included which lists the journals in which these scientific publications appeared. This not only assists in identifying source material but indicates the wide range of scientific pursuit encompassed by the Bioscience Programs Division. It is interesting to note here that the publications have appeared in 268 scientific and technical journals.

Also in the appendix is a list of senior authors' affiliations which, when correlated with the directory of laboratory addresses, makes communication with a senior author possible. Copies or reprints of the citations embodied herein cannot be furnished by either NASA or BSCP but may be obtained by contacting the senior authors.

It should be noted that no practical means was available for verifying a few of the references given by the authors and, as a result, some citations are incomplete. This is especially true in cases where papers appeared in lesser known sources and/or were "in press".

The authors gratefully acknowledge the technical assistance of Miss Sheila Rollins and of the secretarial staff in the preparation of this report.

Leslie A. Kulp, Ph.D.

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AUTHOR INDEX FOR THE ENVIRONMENTAL BIOLOGY PROGRAM

PERMUTED TITLE INDEX

SENIOR AUTHORS AND ABBREVIATED LABORATORY ADDRESSES

The individuals listed below are those authors whose names appear as senior authors of a paper. They are in alphabetical order, with the laboratory or institution in which they performed their research designated in abbreviation. These abbreviations for the laboratories and universities are written out in full on pages 59 through 61 which is an alphabetical listing with the complete addresses given.

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ANALYSIS OF THE PUBLICATION SOURCES

Under the auspices of the Environmental Biology Program, 334 papers were published by NASA's Bioscience grantees and contractors. These papers were indexed under the various scientific pursuits listed in the table on page 63, some of which represent well recognized disciplines whereas others merely represent subject areas currently receiving notable attention. In those instances where reports might have been subsumed under more than one category, consideration was given to the scientific orientation of the author(s) or to the source of publication. Arbitrary decisions had to be made but these were not sufficient in quantity to significantly affect the data reported.

The figures on the following pages were constructed to represent, chronologically, the publication frequencies of the major subject fields. The frequency of publication for each area of study was derived by dividing the number of publications appearing in each given year by the total number for all the years considered. The publications appearing in 1960 and 1961 were combined with those of 1962 because of the small number of reports which were issued during these earlier years. The data used for the graphic illustration of 1966 included those citations listed as "in press" for that year. On the other hand, since the list of citations for 1967 was incomplete, it was omitted from the figures.

The figures derived from this study provide, to some extent, an indication of the activity and direction of research within this office. Figure 1 points out that the total publication effort has consistently risen each year although in the more recent years the increase was less pronounced. Studies on Environmental Extremes (Figure 4) have undergone the most rapid growth, from 3% in 1963 to 46% in 1966. Significant growth is also evident in the areas of Biochemistry (Figure 2), Gravity, Acceleration and Weightlessness (Figure 6) and Gaseous Environments (Figure 7). Publications on Radiobiology (Figure 3) and Bioinstrumentation and Techniques (Figure 5) have declined in recent years.

In this report, Gaseous Environments dealt with the tolerance of man and animals to various types of oxygen-mixed atmospheres and atmospheres of different pressures, whereas studies involving the effects of primitive atmospheres on the survival and growth of microorganism and plants were subsumed together with other studies under Extreme Environments.

	1960	1961	1962	1963	1964	1965	1966	No Date	In Press 1966	In Press 1967	In Press No Date	TOTAL
Biochemistry			3	8	12	7	16		5	2	3	56
Radiobiology		2	4	12	17	11	4		2		2	54
Environmental Extremes			1	1	6	9	12	3	2		11	45
Bioinstrumentation and Techniques	1		3	7	13	6	2		1	1	4	38
Gravity, Acceleration and Weightlessness			1	8	4	13	8	1	2		1	38
Gaseous Environments			1	1	6	11	11		1		4	35
Photosynthesis		2		6	3	7			3			21
Physiology					4	9	2		2		4	21
Biomagnetism			3	3	3	2	1		1			13
Statistics				1		1	2		2			6
Biology			1		1		1			1	1	5
Histology					1		1					2
TOTAL	1	4	17	47	70	76	60	4	21	4	30	334

Table. Number of studies under the NASA Environmental Biology Program for the years 1960-1967 according to primary research areas.

Graphic Representation of the
Annual Distribution of Publications
in the Subdisciplines of Environmental Biology

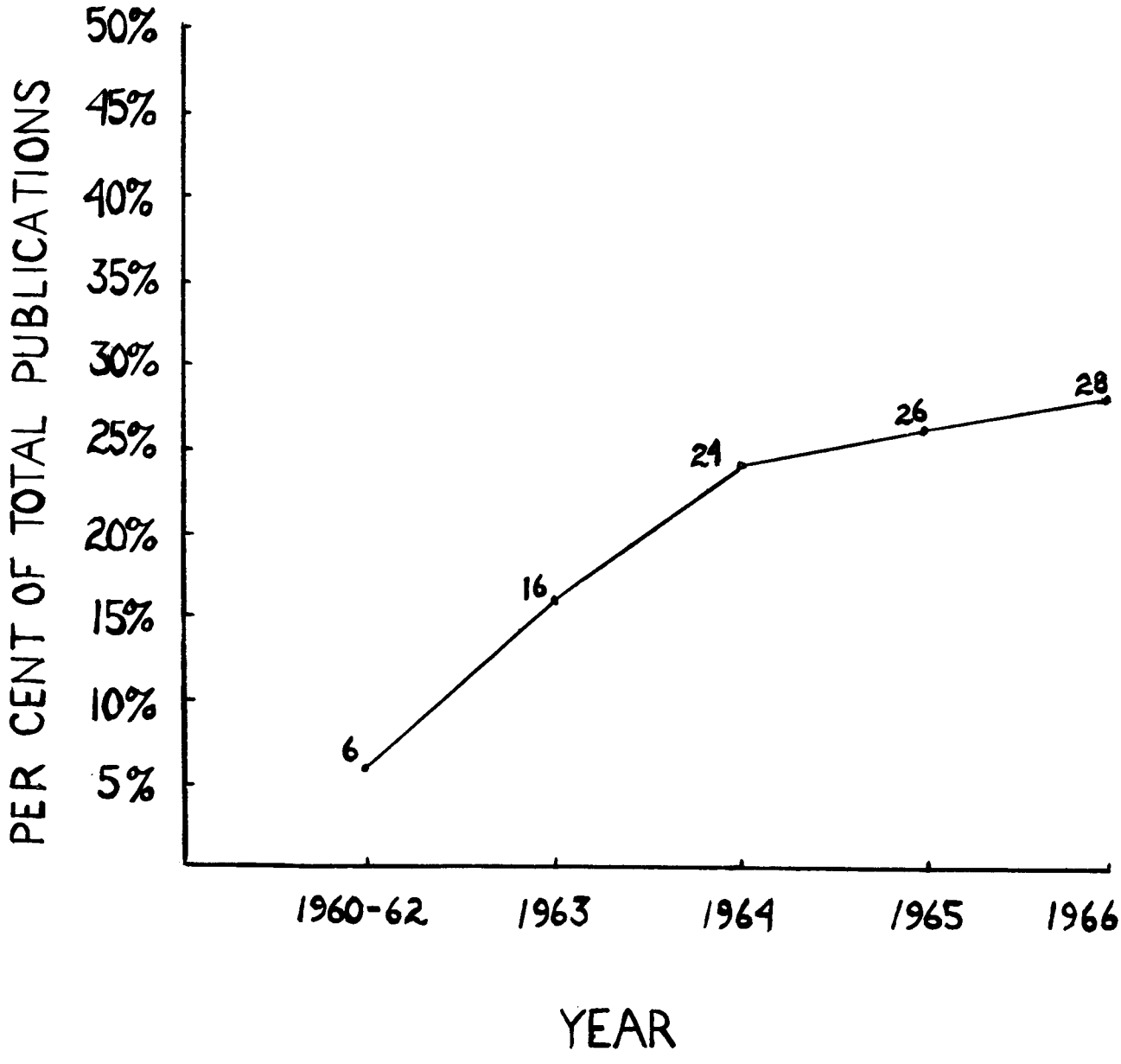

Figure 1. All Fields

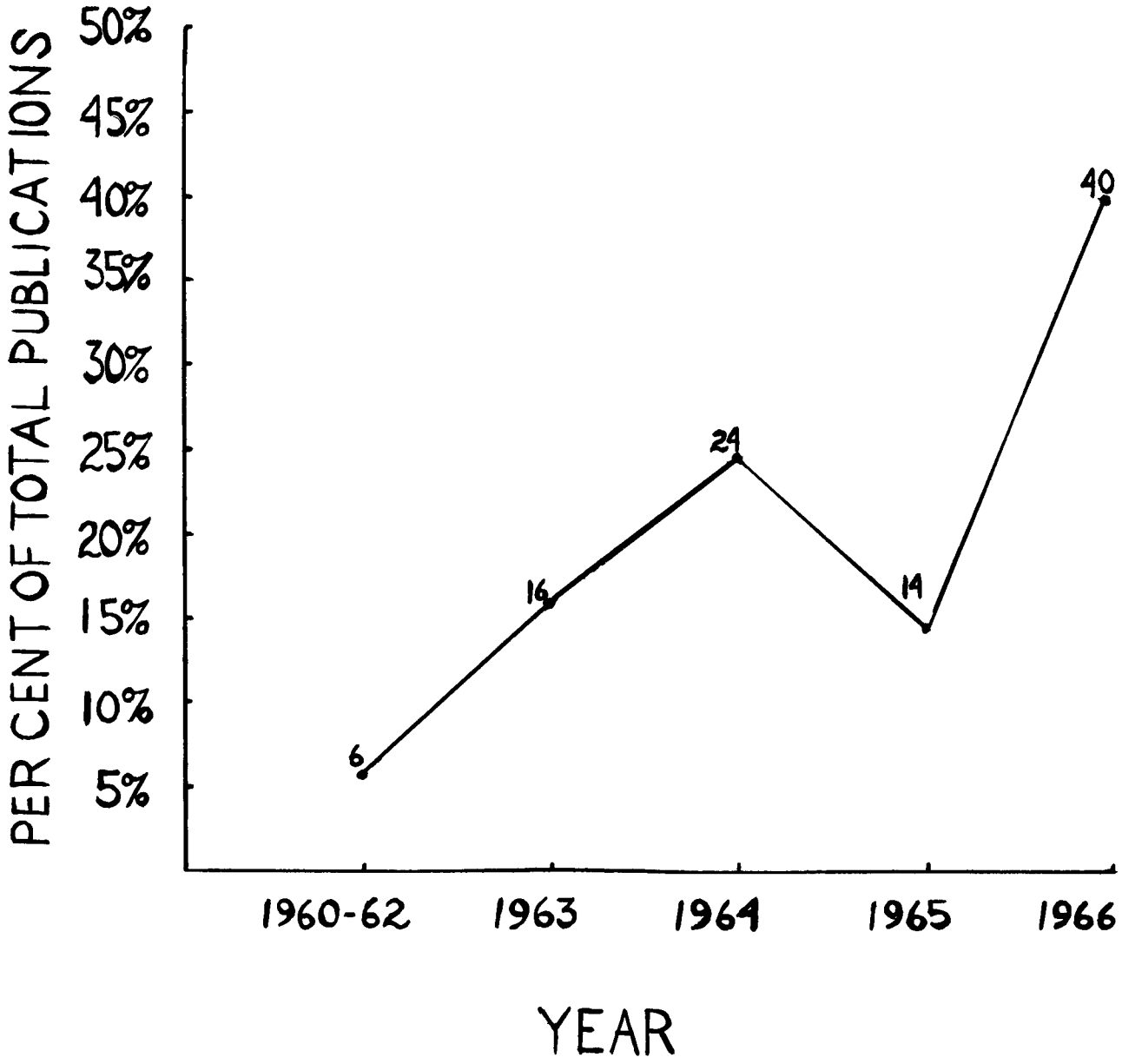

Figure 2. Biochemistry

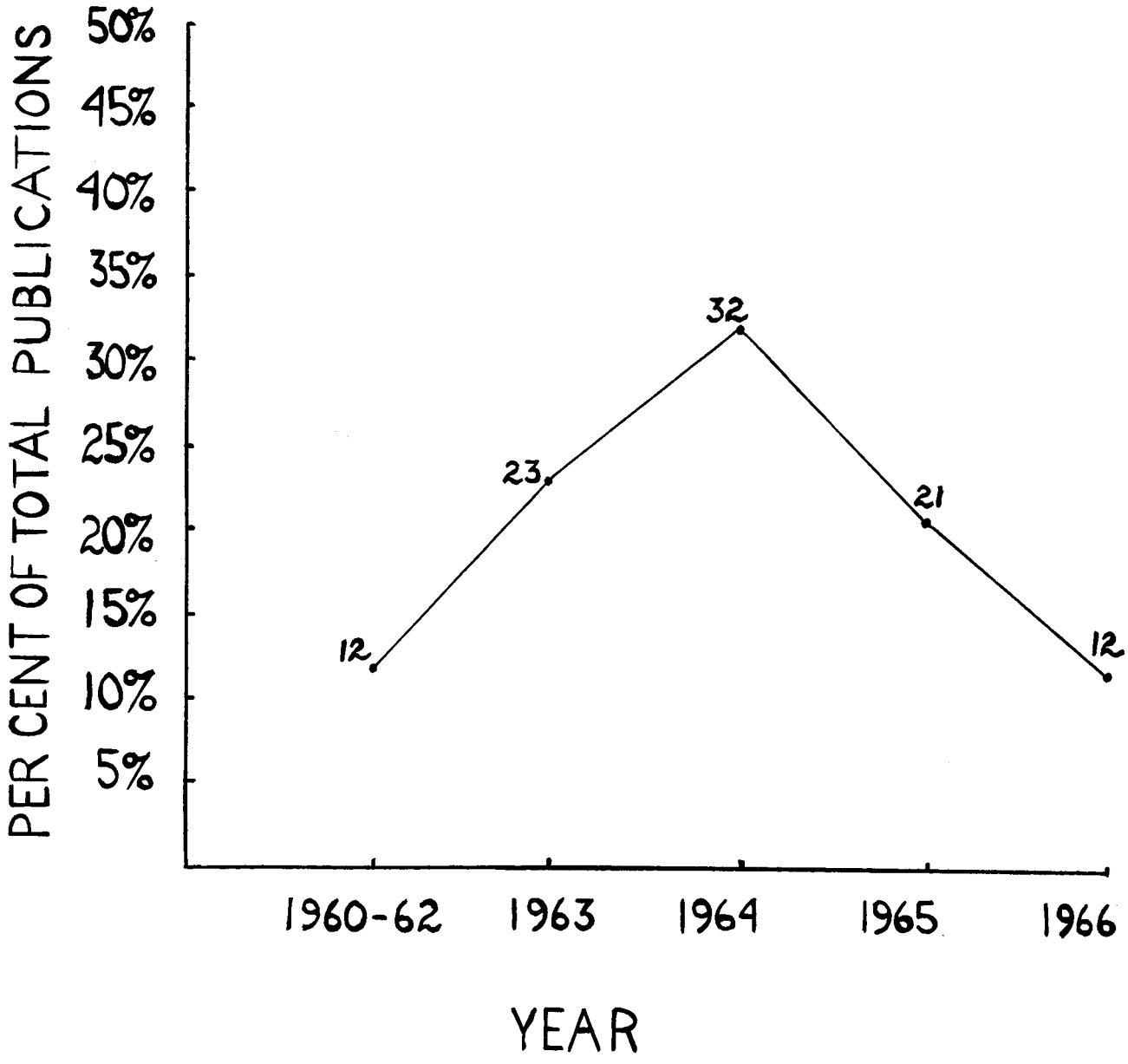

Figure 3. Radiobiology

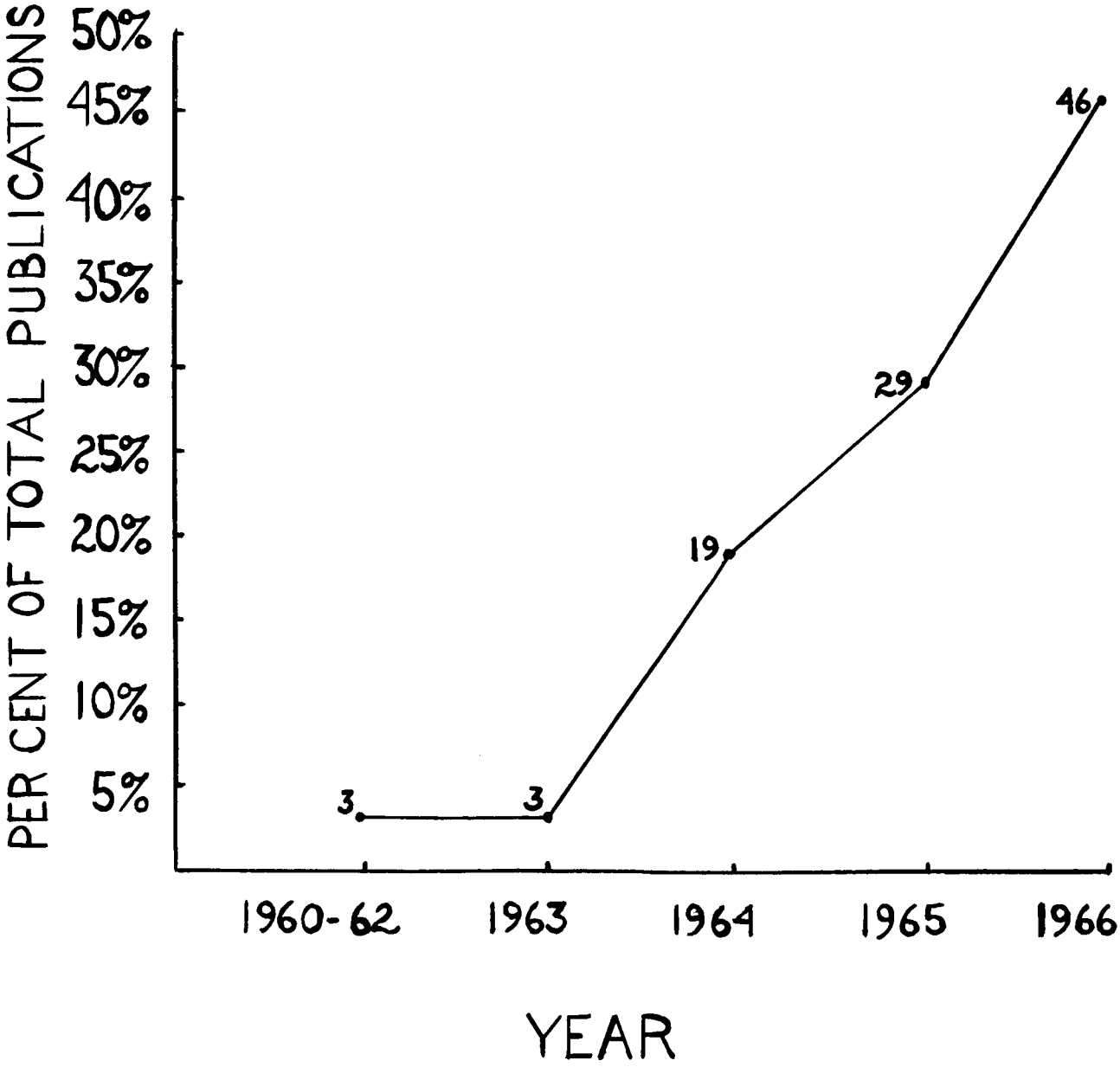

Figure 4. Environmental Extremes

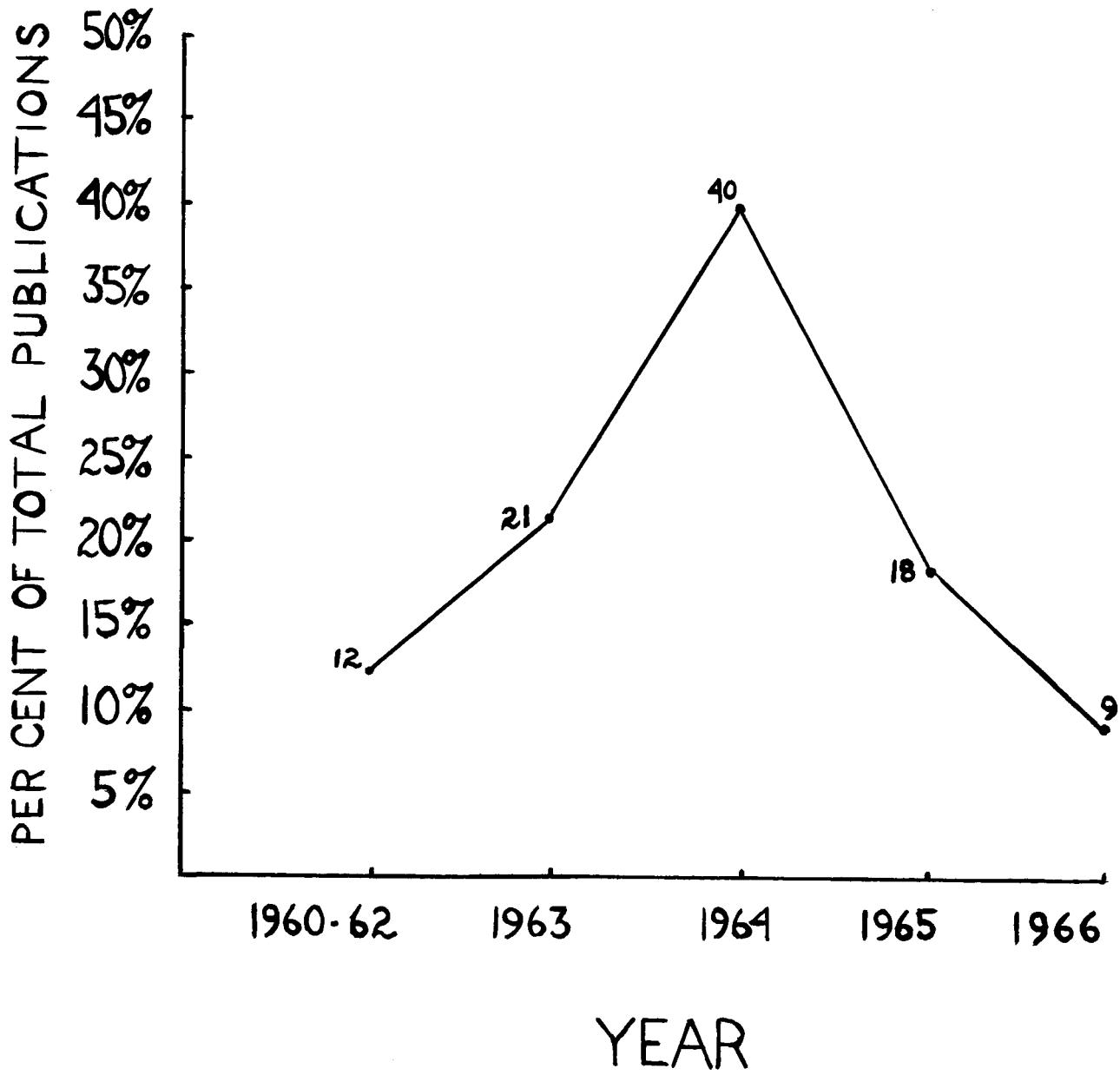

Figure 5. Bioinstrumentation and Techniques

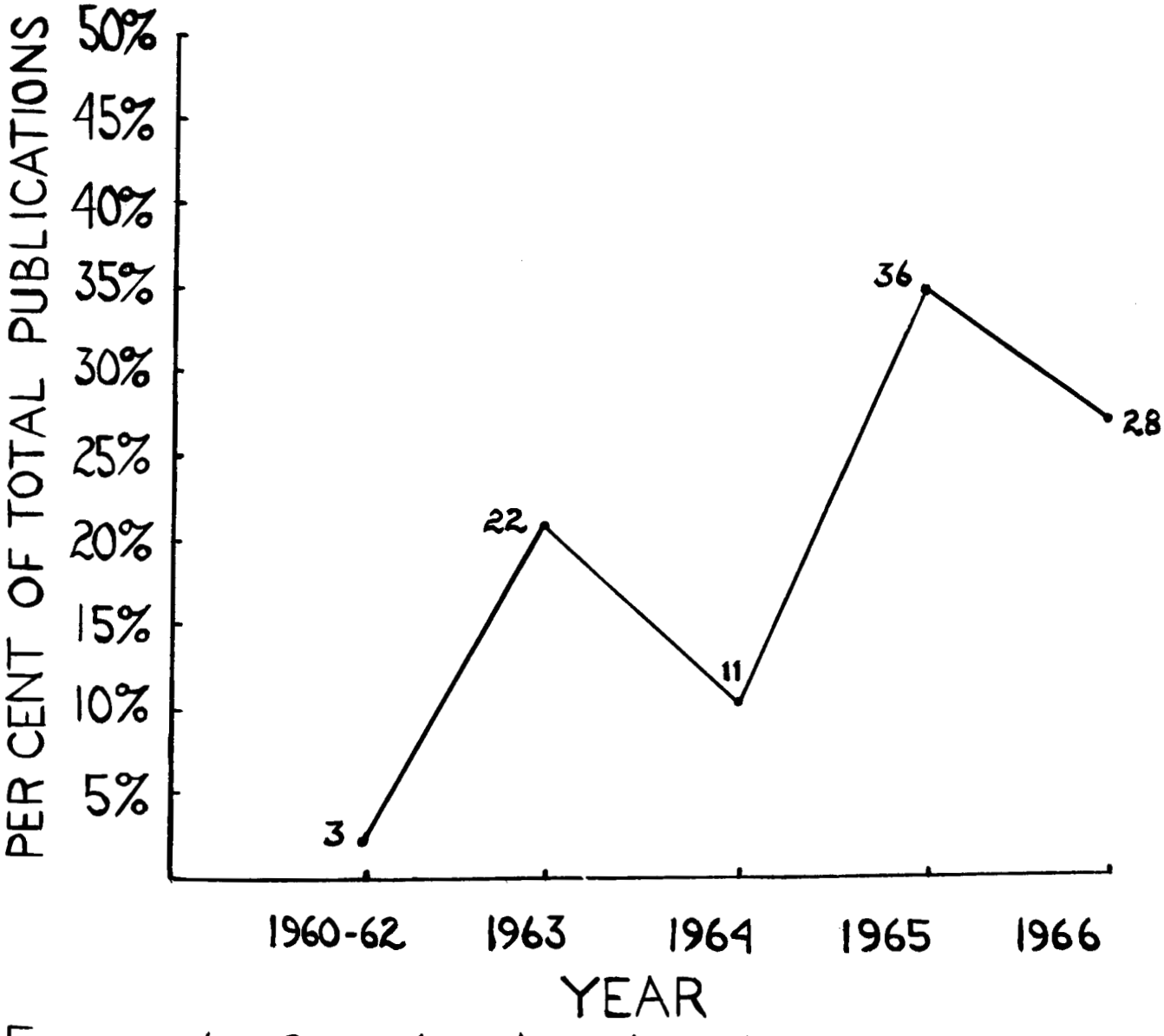

Figure 6. Gravity, Acceleration and Weightlessness

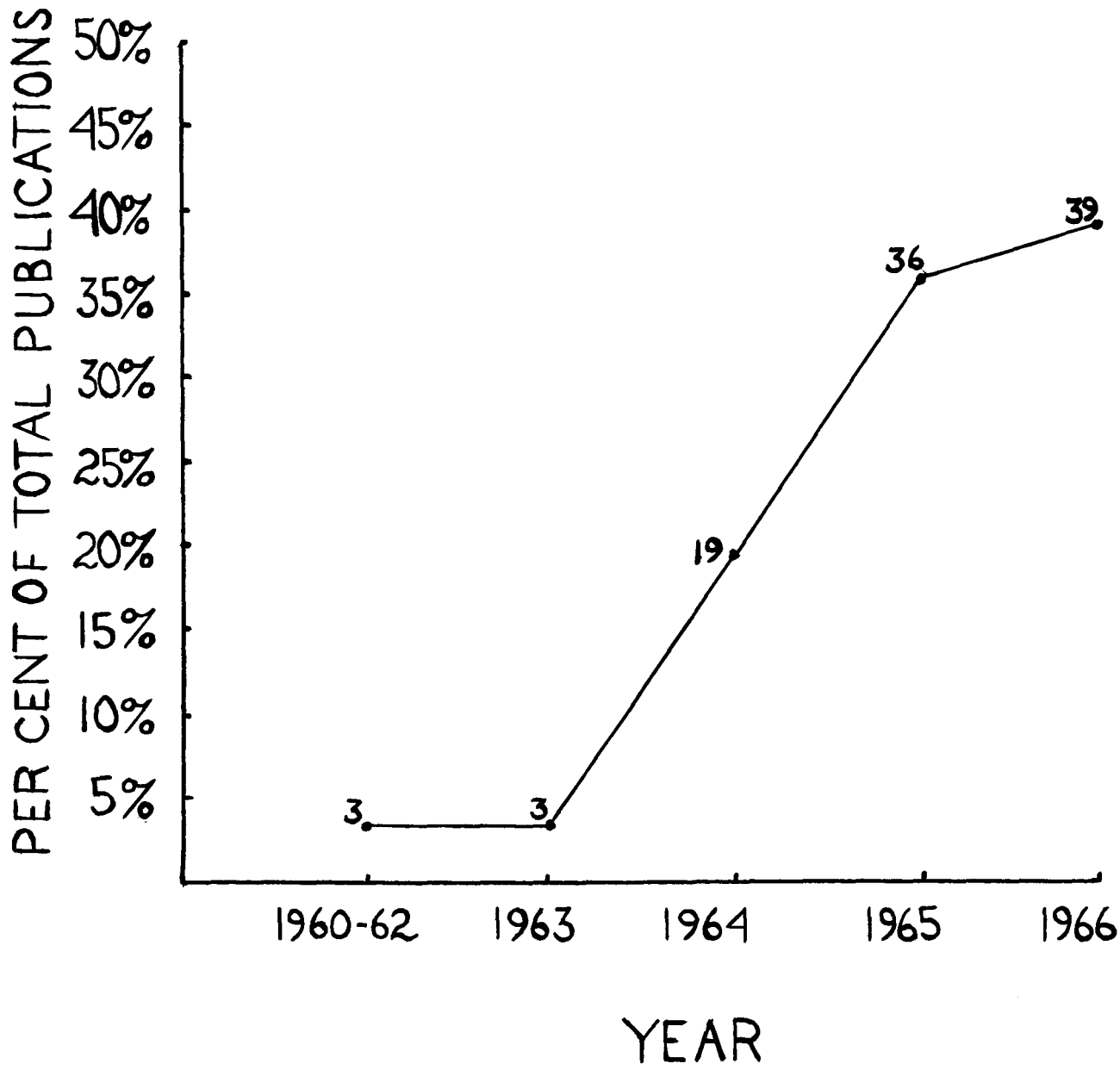

Figure 7. Gaseous Environments

JOURNALS PUBLISHING ENVIRONMENTAL BIOLOGY ARTICLES

The following is an alphabetical list of journals in which some of the 344 articles appeared that resulted from research supported by the NASA Environmental Biology Program.

It is of particular interest to note the relatively large number of journals which have accepted one or more papers. The numbers in parentheses indicate the number of articles appearing in that journal.

Advances in the Astronautical Sciences (1)
Advances in Chemical Engineering (1)
Advances in Space Sciences and Technology (1)
Aerospace Medicine (18)
AIChE Journal (American Institute of Chemical Engineers) (1)
American Journal of Botany (4)
American Journal of Pathology (2)
American Journal of Physiology (8)
American Psychologist (1)
ARS Journal (American Rocket Society) (1)
Anatomical Record (2)
Annals of the New York Academy of Sciences (3)
Archiv fur Hydrobiologie (1)
Archiv fur Mikrobiologie (4)
Archives of Environmental Health (1)
Astronautics (presently Astronautics and Aeronautics) (1)

Bacteriological Proceedings (1)
Batelle Technical Review (1)
Biochimica et Biophysica Acta (4)
Biomedical Sciences Instrumentation (1)
Biophysical Journal (1)
Biotechnology and Bioengineering (1)
Botanical Gazette (3)
Bulletin of Mathematical Biophysics (1)
The Bulletin of Pathology (1)
Bulletin of the Torrey Botanical Club (1)

Canadian Journal of Microbiology (1)
Canadian Journal of Physiology and Pharmacology (1)
Canadian Journal of Zoology (1)
Cancer Research (4)
Comparative Biochemistry and Physiology (1)
Cryobiology (1)

Developments in Industrial Microbiology (6)

Experientia (2)
Experimental Cell Research (3)

Federation Proceedings (14)
Fertility and Sterility (1)
Folia Primatologica (1)

The Gerontologist (1)

Icarus (1)
I and E C Process Design and Development (Industrial and Engineering Chemistry) (2)
IRE Transactions on Medical Electronics (Institute of Radio Engineers) (presently IEEE Transactions on Biomedical Electronics) (1)
International Journal of Radiation Biology (and Related Studies in Physics, Chemistry and Medicine) (2)

Journal of the American Oil Chemists Society (1)
Journal of Applied Physiology (8)
Journal of the Arkansas Medical Society (1)
Journal of Bacteriology (4)
Journal of Cell Biology (2)
Journal of Cellular and Comparative Physiology (1)
Journal of Experimental Botany (1)
Journal of Fermentation Technology (1)
Journal of General Microbiology (1)
Journal of Phycology (1)
Journal de Physiologie (2)
Journal of the Royal Microscopical Society (1)
Journal of Surgical Research (1)
Journal of Theoretical Biology (2)

Laboratory Animal Care (1)
Laboratory Investigation (2)
Laboratory Primate Newsletter (1)
Life Sciences (1)

Memorie dell Instituto Italiano de Idrobiologia (Supplement) (1)
Microchemical Journal (4)

Nature (9)
Naturwissenschaft und Medizin (1)
Naval Research Reviews (1)

Physiologia Plantarum (1)
The Physiologist (17)
Plant and Cell Physiology (1)
Plant Physiology (18)
Planta (Berlin) (2)
Poultry Science (4)
Proceedings of the American Association for Cancer Research (2)
Proceedings of the Missouri Academy of Sciences (3)
Proceedings of the National Academy of Sciences (2)
Proceedings of the Society for Experimental Biology and Medicine (4)
Protoplasma (1)

Radiation Botany (1)
Radiation Research (3)
Record of Chemical Progress (1)

Science (7)

Texas Reports on Biology and Medicine (2)